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Social Ecology  
  
Communal eco-friendly behaviours are notable in the communal insects, mudmoulds, social spiders, human society, and naked mole-rats where eusocialism has evolved. Social behaviours include reciprocally beneficial behaviours among kin and nest mates[116][121][132] and evolve from kin and group selection. Kin selection explains altruism through genetic relationships, whereby an altruistic behaviour leading to death is rewarded by the survival of genetic copies distributed among surviving relatives.   
  
Social ecology is a critical social theory founded by American anarchist and libertarian socialist author Murray Bookchin. Conceptualized as a critique of current social, political, and anti-ecological trends, it espouses a reconstructive, ecological, communitarian, and ethical approach to society. This version advocates a reconstructive and transformative outlook on social and environmental issues, and promotes a directly democratic, confederal politics.   
  
As a body of ideas, social ecology envisions a moral economy that moves beyond scarcity and hierarchy, toward a world that reharmonizes human communities with the natural world, while celebrating diversity, creativity and freedom. Bookchin suggests that the roots of current ecological and social problems can be traced to hierarchical modes of social organization. Social ecologists claim that the systemic issue of hierarchy cannot be resisted by individual actions alone such as ethical consumerism but must be addressed by more nuanced ethical thinking and collective activity grounded in radically democratic ideals. The complexity of relationships between people and nature is emphasized, along with the importance of establishing more mutualistic social structures that take account of this.  
  
Social Insects  
  
The social insects, including ants, bees, and wasps are most famously studied for this type of relationship because the male drones are clones that share the same genetic make-up as every other male in the colony.[121] In contrast, group selectionists find examples of altruism among non-genetic relatives and explain this through selection acting on the group; whereby, it becomes selectively advantageous for groups if their members express altruistic behaviours to one another. Groups with predominantly altruistic members beat groups with predominantly selfish members.  
  
Social ecology's social component comes from its position that nearly all of the world's ecological problems stem from social problems; with these social problems in turn arising from structures and relationships of dominating hierarchy. They argue that apart from those produced by natural catastrophes, the most serious ecological dislocations of the 20th and 21st centuries have as their cause economic, ethnic, cultural, and gender conflicts, among many others. Present ecological problems, social ecologists maintain, cannot be clearly understood, much less resolved, without resolutely dealing with problems within society.[2]

Social ecology is associated with the ideas and works of Murray Bookchin, who had written on such matters from the 1950s until his death, and, from the 1960s, had combined these issues with revolutionary social anarchism. His works include Post-Scarcity Anarchism (1971), Toward an Ecological Society (1980), and The Ecology of Freedom (1982).

The notion that man must dominate nature emerges directly from the domination of man by man… But it was not until organic community relation … dissolved into market relationships that the planet itself was reduced to a resource for exploitation. This centuries-long tendency finds its most exacerbating development in modern capitalism. Owing to its inherently competitive nature, bourgeois society not only pits humans against each other, it also pits the mass of humanity against the natural world. Just as men are converted into commodities, so every aspect of nature is converted into a commodity, a resource to be manufactured and merchandised wantonly. … The plundering of the human spirit by the market place is paralleled by the plundering of the earth by capital

Ecosystem Ecology  
  
Ecosystems may be habitats within biomes that form an integrated whole and a dynamically responsive system having both physical and biological complexes. Ecosystem ecology is the science of determining the fluxes of materials (e.g. carbon, phosphorus) between different pools (e.g., tree biomass, soil organic material). Ecosystem ecologist attempt to determine the underlying causes of these fluxes. Research in ecosystem ecology might measure primary production (g C/m^2) in a wetland in relation to decomposition and consumption rates (g C/m^2/y). This requires an understanding of the community connections between plants (i.e., primary producers) and the decomposers (e.g., fungi and bacteria).

Man and Nature   
  
The underlying concept of ecosystem can be traced back to 1864 in the published work of George Perkins Marsh ("Man and Nature").[67][68] Within an ecosystem, organisms are linked to the physical and biological components of their environment to which they are adapted.[65] Ecosystems are complex adaptive systems where the interaction of life processes form self-organizing patterns across different scales of time and space.[69] Ecosystems are broadly categorized as terrestrial, freshwater, atmospheric, or marine. Differences stem from the nature of the unique physical environments that shapes the biodiversity within each. A more recent addition to ecosystem ecology are technoecosystems, which are affected by or primarily the result of human activity.  
  
Ecosystem ecology is the integrated study of living (biotic) and non-living (abiotic) components of ecosystems and their interactions within an ecosystem framework. This science examines how ecosystems work and relates this to their components such as chemicals, bedrock, soil, plants, and animals.

Ecosystem ecology examines physical and biological structures and examines how these ecosystem characteristics interact with each other. Ultimately, this helps us understand how to maintain high quality water and economically viable commodity production. A major focus of ecosystem ecology is on functional processes, ecological mechanisms that maintain the structure and services produced by ecosystems. These include primary productivity (production of biomass), decomposition, and trophic interactions.

Studies of ecosystem function have greatly improved human understanding of sustainable production of forage, fiber, fuel, and provision of water. Functional processes are mediated by regional-to-local level climate, disturbance, and management. Thus ecosystem ecology provides a powerful framework for identifying ecological mechanisms that interact with global environmental problems, especially global warming and degradation of surface water.

This example demonstrates several important aspects of ecosystems:

Ecosystem boundaries are often nebulous and may fluctuate in time.Organisms within ecosystems are dependent on ecosystem level biological and physical processes.Adjacent ecosystems closely interact and often are interdependent for maintenance of community structure and functional processes that maintain productivity and biodiversity

These characteristics also introduce practical problems into natural resource management. Who will manage which ecosystem? Will timber cutting in the forest degrade recreational fishing in the stream? These questions are difficult for land managers to address while the boundary between ecosystems remains unclear; even though decisions in one ecosystem will affect the other. We need better understanding of the interactions and interdependencies of these ecosystems and the processes that maintain them before we can begin to address these questions.

Ecosystem ecology is an inherently interdisciplinary field of study. An individual ecosystem is composed of populations of organisms, interacting within communities, and contributing to the cycling of nutrients and the flow of energy. The ecosystem is the principal unit of study in ecosystem ecology.

Physiological Ecology  
  
Population, community, and physiological ecology provide many of the underlying biological mechanisms influencing ecosystems and the processes they maintain. Flowing of energy and cycling of matter at the ecosystem level are often examined in ecosystem ecology, but, as a whole, this science is defined more by subject matter than by scale. Ecosystem ecology approaches organisms and abiotic pools of energy and nutrients as an integrated system which distinguishes it from associated sciences such as biogeochemistry.[1]

Biogeochemistry and hydrology focus on several fundamental ecosystem processes such as biologically mediated chemical cycling of nutrients and physical-biological cycling of water. Ecosystem ecology forms the mechanistic basis for regional or global processes encompassed by landscape-to-regional hydrology, global biogeochemistry, and earth system science.

Ecological Complexity  
  
Complexity is understood as a large computational effort needed to piece together numerous interacting parts exceeding the iterative memory capacity of the human mind. Global patterns of biological diversity are complex. This biocomplexity stems from the interplay among ecological processes that operate and influence patterns at different scales that grade into each other, such as transitional areas or ecotones spanning landscapes. Complexity stems from the interplay among levels of biological organization as energy, and matter is integrated into larger units that superimpose onto the smaller parts. "What were wholes on one level become parts on a higher one."[95]:209 Small scale patterns do not necessarily explain large scale phenomena, otherwise captured in the expression (coined by Aristotle) 'the sum is greater than the parts'.[96][97][E]

Complexity in ecology   
  
"Complexity in ecology is of at least six distinct types: spatial, temporal, structural, process, behavioral, and geometric."[98]:3 From these principles, ecologists have identified emergent and self-organizing phenomena that operate at different environmental scales of influence, ranging from molecular to planetary, and these require different explanations at each integrative level.[48][99] Ecological complexity relates to the dynamic resilience of ecosystems that transition to multiple shifting steady-states directed by random fluctuations of history.[9][100]

Complex Table (less accessible)  
 **Class Schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LESSON** | **TOPIC** | **ASSIGNMENT** | **Points** | **DUE** |
| 1 | What is Distance Learning ? | Wiki #1 | 10 | March 10 |
| Presentation | 20 |  |
| 2 | History & Theories | Brief Paper | 20 | March 24 |
| Spring Break | | | | |
| 3 | Distance Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog 1 | 10 | April 21 |

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Cognitive ecology   
  
Cognitive ecology integrates theory and observations from evolutionary ecology and neurobiology, primarily cognitive science, in order to understand the effect that animal interaction with their habitat has on their cognitive systems and how those systems restrict behavior within an ecological and evolutionary framework.[128] "Until recently, however, cognitive scientists have not paid sufficient attention to the fundamental fact that cognitive traits evolved under particular natural settings. With consideration of the selection pressure on cognition, cognitive ecology can contribute intellectual coherence to the multidisciplinary study of cognition."[129][130]   
  
Coupling  
  
As a study involving the 'coupling' or interactions between organism and environment, cognitive ecology is closely related to enactivism,[128] a field based upon the view that "...we must see the organism and environment as bound together in reciprocal specification and selection..."  
  
Cognitive ecology is the study of cognitive phenomena within social and natural contexts.[1] It is an integrative perspective drawing from aspects of ecological psychology, cognitive science, evolutionary ecology and anthropology. Notions of domain-specific modules in the brain and the cognitive biases they create are central to understanding the enacted nature of cognition within a cognitive ecological framework. This means that cognitive mechanisms not only shape the characteristics of thought, but they dictate the success of culturally transmitted ideas. Because culturally transmitted concepts can often inform ecological decision-making behaviors, group-level trends in cognition (i.e., culturally salient concepts) are hypothesized to address ecologically relevant challenges.  
  
Ecological psychology

While the multi-faceted nature of cognitive ecology is a consequence of its interdisciplinary history, it primarily derives from early work in ecological psychology. Paradigm shifts from behaviorist orientations of psychology to cognition, or the "cognitive revolution",[3][4] gave rise to the ecological psychology approach, which distanced itself from mainstream cognitivist views by breaking down the common mind-environment dichotomy of psychological theory.[5]

One particularly influential progenitor of this work was ecological psychologist James Gibson, whose legacy is marked by his ideas on ecological and social affordances. These are the opportunistic features of environmental objects that can be exploited for human use, and are therefore particularly perceptible (e.g., a knob affords twisting, an agreeable social cue affords a warm reaction).[6] Gibson argued further that organisms cannot be disentangled from their environments, and that their cognitive constraints were consequences of a limited set of environmental invariants which shaped them over evolutionary time.[5][7] An illustrative example for Gibson is the human capacity for three-

dimensional visual perception, which he argues is a cognitive concept resulting from the way that people interact with their environment.[8]

Another foreshadowed element of cognitive ecological theory comes from ecological anthropologist Gregory Bateson, who considered the notion of informational feedback loops between mind and environment, particularly their role in generating meaning and awareness of one's surroundings. In an essay, he speculates on how an observer might best delineate the "self" of a blind man. In his treatment, he questions whether one may arbitrarily choose to carve out the man's informational processing loop at his brain or his hands or his walking stick without offering an incomplete view of his cognitive process.[9] This discussion of concept remains influential in modern cognitive ecological considerations of the densely interconnected elements of ecology that play relevant roles in cognition.

Biogeography  
  
Biogeography is the study of the distribution of species and ecosystems in geographic space and through geological time. Organisms and biological communities often vary in a regular fashion along geographic gradients of latitude, elevation, isolation and habitat area.[1] Phytogeography is the branch of biogeography that studies the distribution of plants. Zoogeography is the branch that studies distribution of animals.

Knowledge of spatial variation in the numbers and types of organisms is as vital to us today as it was to our early human ancestors, as we adapt to heterogeneous but geographically predictable environments. Biogeography is an integrative field of inquiry that unites concepts and information from ecology, evolutionary biology, geology, and physical geography.[2]

Modern biogeographic research combines information and ideas from many fields, from the physiological and ecological constraints on organismal dispersal to geological and climatological phenomena operating at global spatial scales and evolutionary time frames.

The short-term interactions within a habitat and species of organisms describe the ecological application of biogeography. Historical biogeography describes the long-term, evolutionary periods of time for broader classifications of organisms.[3] Early scientists, beginning with Carl Linnaeus, contributed to the development of biogeography as a science. Beginning in the mid-18th century, Europeans explored the world and discovered the biodiversity of life.

The scientific theory of biogeography grows out of the work of Alexander von Humboldt (1769–1859),[4] Hewett Cottrell Watson (1804–1881),[5] Alphonse de Candolle (1806–1893),[6] Alfred Russel Wallace (1823–1913),[7] Philip Lutley Sclater (1829–1913) and other biologists and explorers.  
  
Introduction

The patterns of species distribution across geographical areas can usually be explained through a combination of historical factors such as: speciation, extinction, continental drift, and glaciation. Through observing the geographic distribution of species, we can see associated variations in sea level, river routes, habitat, and river capture. Additionally, this science considers the geographic constraints of landmass areas and isolation, as well as the available ecosystem energy supplies.

Over periods of ecological changes, biogeography includes the study of plant and animal species in: their past and/or present living refugium habitat; their interim living sites; and/or their survival locales.[9] As writer David Quammen put it, "...biogeography does more than ask Which species? and Where. It also asks Why? and, what is sometimes more crucial, Why not?."[10]

Modern biogeography often employs the use of Geographic Information Systems (GIS), to understand the factors affecting organism distribution, and to predict future trends in organism distribution.[11] Often mathematical models and GIS are employed to solve ecological problems that have a spatial aspect to them.[12]

Biogeography is most keenly observed on the world's islands. These habitats are often much more manageable areas of study because they are more condensed than larger ecosystems on the mainland.[13] Islands are also ideal locations because they allow scientists to look at habitats that new invasive species have only recently colonized and can observe how they disperse throughout the island and change it. They can then apply their understanding to similar but more complex mainland habitats. Islands are very diverse in their biomes, ranging from the tropical to arctic climates. This diversity in habitat allows for a wide range of species study in different parts of the world.

One scientist who recognized the importance of these geographic locations was Charles Darwin, who remarked in his journal "The Zoology of Archipelagoes will be well worth examination".[13] Two chapters in On the Origin of Species were devoted to geographical distribution.

## 18th century

The first discoveries that contributed to the development of biogeography as a science began in the mid-18th century, as Europeans explored the world and discovered the biodiversity of life. During the 18th century most views on the world were shaped around religion and for many natural theologists, the bible. Carl Linnaeus, in the mid-18th century, initiated the ways to classify organisms through his exploration of undiscovered territories. When he noticed that species were not as perpetual as he believed, he developed the Mountain Explanation to explain the distribution of biodiversity. When Noah’s ark landed on Mount Ararat and the waters receded, the animals dispersed throughout different elevations on the mountain. This showed different species in different climates proving species were not constant.[3] Linnaeus’ findings set a basis for ecological biogeography. Through his strong beliefs in Christianity, he was inspired to classify the living world, which then gave way to additional accounts of secular views on geographical distribution.[8] He argued that the structure of an animal was very closely related to its physical surroundings. This was important to a George Louis Buffon’s rival theory of distribution.